VEHICLE, PROCESS AND SYSTEM FOR MASS TRANSPORTATION

Cross Reference to Related Applications

The present application claims priority to provisional application having serial number 60/517,046 entitled “Process for Mass transporatation System Using Personal Transport Vehicles”, filed on November 3, 2003, which is incorporated herein by reference.

The present application also claims priority to the International Application filed under the PCT entitled “Process for Mass transporatation System Using Personal Transport Vehicles”, having international application number PCT/US2004/036608, filed on November 3, 2004, which is incorporated herein by reference.

Background of the Invention

[0001] This invention relates generally to the field of transportation, and more specifically to a process for Mass transportation System Using Personal Transport Vehicles.

[0002] While travel by train, subway, trolleycars or light rails travel still provides an efficient methods of moving goods and people, the wide spead use of automobiles and buses competes because of the route flexibility and personal freedom it provides.

[0003] However, modern high speed trains can provide fast and efficient movement of people, at speeds over 200 mph.

[0004] High speed trains require a national committment to infrastructure of track, stations, and cars. The schedules are necesarrily fixed, as well as the reach or distribution of track, based on cost to potential ridership. Accordingly, rail based mass transit has been viewed as generally not compatible in many suburban areas, particularaly those having diverse intersuburb commuting patterns.

Brief Summary of the Invention

[0005] The primary object of the invention is to reduce traffic congestion.

[0006] Another object of the invention is to provide for high speed transportation between and within cities.

[0007] Another object of the invention is Increase transportation system capacity with minimum capital cost and taking of land for infrastructure.

[0008] A further object is to achieve the benefits of mass transit rail systems for a greater majority of the population, at a reduced cost, while avoiding the loss of freedom it entails as to schedule and the lack of a persoanl transportation vehicle, or needed persoanl transportation between stations and terminal destinations.

[0009] Other objects and advantages of the present invention will become apparent from the following descriptions, taken in connection with the accompanying drawings, wherein, by way of illustration and example, an embodiment of the present invention is disclosed.

[0010] In accordance with a preferred embodiment of the invention, there is disclosed a process for Mass transportation System Using Personal Transport Vehicles comprising the steps of providing a Primary Transport track (or Roadway), and a Switching track that connects the primary track with standard roads wherein vehicles enter and leave the primary track via the Switching track without a change in velocity. In another aspect of the invention the track configuration permits the grouping of seperable vehicles, in so called pods, on the primary transport track for high speed travel. Pod assembly and disassembly can occur by the selective switching of a single vehicle to or from the switching track without necessarily having to change the pod velocity. To maxamize aerodynamic effiency, the PTV's can hold postions within Pods by mechanical coupling, magnetic coupling, aerodynamic coupling, distance sensors and computer controled combanations of these.

[0011] In another aspect the spacing between pods permits the addition of new vehicles to the pod in a controlled sequence.

[0012] In yet another aspect of the invention the vehicle include a standard road wheel and manual steering capability, but also include an actuator controlled system for engaging the switching track such that the primary track engaging wheel or member does not interfere with standard road wheels.

[0013] In another aspect of the invention the vehicles use an elevating mechanisim to lift the primary track wheels off the primary track while diverting to the switiching track. This can be accomplished by magnetic levitation; mechanical, areodynamic, or air pressure lifting; or combinations of these. For example, as a vehicle travels on a primary track or road, it passes over a switching zone that uses magnetic fields to lift and/or shift the vehicle onto the switching track.

[0014] In another aspect of the invention there is provided a process for transporting vehicles on a primary track for travel at a first speed, with a secondary track for switching from primary track to the street, for the grouping of vehicles in spaced apart clusters or pods for travel on the primary track, wherein vehicles within and without these clusters switch to and from the primary track via the secondary track without a significant change in speed, such that the vehicles accelerate or decelerate on the secondary track.

[0015] In yet another aspect of the invention, there is disclosed a process for transporting vehicles, the process comprising; providing a primary track/roadway for travel at a first speed; providing a secondary track/roadway for switching from primary track to the street; wherein each vehicle has its own means or mechanisim, that may be co-ordinated with a means or a mechanisim located at the switching area of the primary track/roadway, for disengaging from the primary track to the secondary track (or visa versa) by using a change in elevation to shift the primary wheels from the primary track to the secondary track without a significant change in speed, such that a vehicle directly behind the switching vehicle is not significanly slowed in its progress on the primary track.

Brief Description of the Drawings

[0016] The drawings constitute a part of this specification and include exemplary embodiments to the invention, which may be embodied in various forms. It is to be understood that in some instances

various aspects of the invention may be shown exaggerated or enlarged to facilitate an understanding of the invention.

[0017] Figure 1 is a schematic diagram illustrating the operation of a portion of the invention.

[0018] Figure 2 is an elevational view of the invention.

[0019] Figure 3A 3B is an elevation of the primary track and switching track.

[0020] Figure 3C is a plan view of the system in Figure 3.

[0021] Figure 4A, B and C are cross sections of the vehicle and switching track engaging features associated with Figure 3 view of the invention.

[0022] Figure 5 is a cross sectional view of an alternative vehicle.

[0023] Figure 6 is a cross sectional view view of an alternative vehicle.

[0024] Figure 7 is a schematic block diagram of the automotive control system as used in the sequence of switching the vehicle.

Detailed Description

[0025] Detailed descriptions of the preferred embodiment are provided herein. It is to be understood, however, that the present invention may be embodied in various forms. Therefore, specific details disclosed herein are not to be interpreted as limiting, but rather as a basis for the claims and as a representative basis for teaching one skilled in the art to employ the present invention in virtually any appropriately detailed system, structure or manner.

[0026] In accordance with the present invention, Figure 1 shows key functional elements of a mass transportation system 100 illustrated in plan view. Vehicles travel from left to right on a first primary track 110 under automated control. Vehicles enter the primary track 110 from ordinary streets or highways 50 under manual control, that is power, breaking and steering functions are under the drivers control, by first entering a secondary or switching track 121. Likewise, vehicles exit the primary track 110 by first entering secondary or switching track 120, and deaccelerate, returning to manual control before entering street or highway 50'. As the primary and secondary tracks may confine the vehicles lateral movement steering is not necessarily required on the tracks.

[0027] In accordance with an important feature of the present invention, Figure 2 is an elevation corresponding to the plan view in Figure 1 showing multiple vehicle, the left most vehicle being 250. A first group of vehicles 210 is led by vehicle 259 and is traveling via a power system on the vehicle that turns track engaging wheels. A second group 200 follows the first group, the second group led by vehicle 254. The groupings will be referred to as pods. The vehicles in the pods are in very close proximity but are controlled to the same speed to maintain pod integrity and avoid collision with each other and vehicles in other pods. The pods are spaced apart to leave room for vehicles to enter the primary track and then join a pod. The optimum spacing between pods takes into account the intended pod velocity, lengths of the secondary track 121 in order to have the entering vehicle reach a sufficent speed to engage the primary track and then join the front or the rear pod or the back of front pod in a control sequence. Optimum switching without a change in pod velocity can occur when the secondary track follows a topography that is out of plane or out of line of travel of other vehicles that define the pod. As will be illustrated in Figure 3, vehicles have an alterenative drive wheel or related track engaging feature that is selectively activated to

switch from the primary track to the secondary track. The secondary track can be a passive switching element, in that the selective tranfer of vehicles between the primary track and secondary track depends on the state of the vehicle, specifically, the vehicles mechanical or electrical actuation of a switching mechanism on the vehicle.

[0028] Turning to FIG.'s 3 and 4, further details of operational features of the vehicles deployed in travel and switching from primary track to secondary track and the reverse are now illustrated. Figure 3 shows vehicle 351 in pod 200 at the transition for switching from primary track 110 to secondary track 120.

[0029] It should be understood that the following discussions of mechanisms for engaging a single wheel can also equally apply to another wheel on the opposite side of the drive axle, and generally applies to each pair of tires and wheels on both the front and rear axle of the vehicle. It willb e appreciated by one of ordinary skill in the art that the same mechanism is also applicable to multi-axle vehicles, as well as to a vehicle that rides on a single tire, that is in frontor back of an axle having a right and left tire. In addition, while the vehicle may ride on three tires on the road, the vehicle wheel may be configured to ride on four rail enaging wheels when on the primary or secondery track.

[0030] Turning to Figs. 4 we illustrate one mode of track switching. Figures 4 A and 4B are elevated cross-section through the vehicle 352 at refernence A-A', in Figure 3. In FIG.4A, the secondary track 120 has spaced apart rails 420a and 420b that are outside rail pair 410 of the primary track 110. The vehicle 352 having a front and rear axial, at least one being driven by the vehicles power system, such the track engaging wheels 411a and 411b mounted thereon turn to propel the vehicle forward in the direction of the track. Track engaging wheels 411a and 411b are disposed co-axially with respect to tires 440a and 44b, being laterally disposed inward therefrom so as not to hinder street travel. As shown in more detail in Figure 4B, the secondary track engaging wheel 430a and 430b are co-axial with the tires and track engaging wheels, being normally integrated into the tire structure, which includes a an actuator 470. Note that a depression is provided between the primary track and secondary track for clearnace of the tires during transit.

[0031] Thus Figures 4A and 4B shows that track wheels 411a and 411b engage opposite rails 410a and 410b of the primary track 120. Track wheel 410a and 410b are mounted to a common drive axle

460 with tires 451a and 451b. While wheel pairs 411 and 421 remained fixed with respect to axle 460 of vehicle 350, the third set of wheels 430a and 430b extend outward when activated for switching in order to engage opposite rails secondary 420a and 420b of secondary track 120.

[0032] As shown in the elevation in FIG. 3, secondary track 120 undergoes an elevation change with respect to primary track 110, causing track wheel 411 to disengage the primary track 110 as the third set of wheels engage rails 420 of secondary track 120. The course of track 120 as definded by rail pair 420a/b extended upward to provide sufficient phyical clearance of both the vehicle and secondary rail pair 420 such that the vehicle is conveyed under either its power or momentum away from the other vehciles in the pod without a significant change in velocity. Thus at reference C-C’ in FIG. 3, vehicle 351 is above vehicles on the primary track, per FIG. 4C. Thus vehicle 351 then deccelrates on the secondery track section 120 that leads to the street. Such a secondary track generally terminates at an elevation above the street allowing the vehicles tires 4551a/b to contact the overlapping roadway section before entering ordinary streets. Thus, the vehicles own bracking system control is optionally returned to control the vehicles speed to normally driving conditions. Likewise steering and speed control are returned at approximately the same time as a normal automobile. Thus, when the vehicle tires are able to engage and turn with sufficient traction on the street the actuator or termination of the secondary track releases the vehicle therefrom. The third wheel set used for switcing can then be returned to the unactivated position inside the tire well.

[0033] As shown in Figure 1, the street or highway 50 or 50’ that connects to the secondary tracks 121 and 120 may run perpendicular, parallell, under or above primary track. Further, at least a part of the secondary track, being an isolated section roadway, may run perpendicular, parallell, under or above primary track until cars reach the lower speed of the traffic they will enter. It should be appreciated that secondary track need not require more space than conventional freeway on or off ramps, other than space for acomodating velocity changes.

[0034] Figure 5 and 6 are examples of vehicles showing the components that engage the secondary track, and the topography of the secondary track with respect to the primary track.

[0035] In Figure 5, secondary track engaging wheels 521a and 521b extending laterally from the sides of the vehicle 550 on hinged backets 571 and 571b respectively. Note that the secondary track is

outside and above of primary track being defined by rails 521a and 521b. Track rails 521a and 521b are raised above the primary track on supports 520a and 520b respectively

[0036] In Figure 6, secondary track 620 is above the vehicle 650 disposed on the lower side of tower 690 which straddles the vehicles. In this embodiment, the secondary track 620 has a narrower gauge or spacing than primary track defined by rails 410a and 410b, and thus suspends the vehicle therefrom on engagement of wheels 623a and 623b with track 620. Wheels 623a and b are mounted on respective axials 622a and 622b which pivot out from the vehicle at hinge 624a and 624b.

[0037] Alternatively, Wheels 624a and 624b are optionaly part of secondary track, rather than the vehicle, as vehicle may have a retracting bracket section (not shown) for engaging with rollers on the secondary track. secondary track supporting memnber need not be continuous, as in a tunnel, but may be series of discrete towers.

[0038] It should be appreciated that many alternative configurations for locating, storing and actuating the secondary track engaging rails will be apparent to one of oridnary skill in the art having the benefit of the disclosure, for example the direction of transport during engagement can be, outward, up/down, as well as in concentric alignment with the tires and primary track

[0039] It should be appreciated that many alternative configurations propulsion power and drive system will be apparent to one of oridnary skill in the art having the benefit of the disclosure. As such it should be understood that the vehicles propulsion system need not be limited to the examples. For example, in addition to using the same power train and engine as for street travel, the vehicle may utilize electric power from track/system with an auxilary electric motor, or the electic motor of a hybrid vehicle, or the vehcile may be only operate under electric power on the tracks and street. In alternative embodiments the primary track includes electric power bus for electric motor on vehicle or recharging a battery on vehicle

[0040] It should be appreciated that many alternative configurations of the track topography and vehicle wheel system will be apparent to one of oridnary skill in the art having the benefit of the disclosure. As such it should be understood that the that the tracks and track engaging wheels need not be limited to the examples. Further, the same drive tires can be used on both the street

and at least one of the primary and secondery track. The track can be configured as a channel to accept a tire, with rolling bumpers for lateral confinement, or a central groove in the tire for mating with a correspong feature in the rail or track system.

[0041] Figure 7 is a schematic block diagram of the automotive control system as used in the sequence of switching the vehicle, showing the changes in relative speed in moving from street travel 710, to secondary rail track 720, accelerating before entering onto the primary rail 730. The on reaching near a final destination entering the exit portion of a seconary track 740 for de-acceleration before entering the final stage of street travel 750. The vehicle transfer to automatic cointrol on the secondary track in stage 720 before entering the primary track 730. The vehicle transfers back to manual control on exiting secondery track 740 before reaching the interface of street 750 and secondary track 740 . Switicng or activation of the third wheels or member that engages the secondary track can be manual or automated, using GPS positioning, track based trasnponder, or other communication devices disposed in main track 750. The control system optimally synchronizes all pods and rearranges vehicles to compresses pods as other vehicle leave the primary track produce wider gaps between vehicles as it can vary the speed of each vehicle in a pod or all vehicles in a pod, or all vehicles in different pods by different amounts.

[0042] It should be further appreciated that the system and vehicles disclosed therein may also comprise toys, amusement park rides, gondolas, chair lifts, as wel as automobiles.

[0043] While the invention has been described in connection with a preferred embodiment, it is not intended to limit the scope of the invention to the particular form set forth, but on the contrary, it is intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.